HIV DISCOURSE IN THE *BRITISH MEDICAL JOURNAL*, 1985-2005 The Impact of digital literacy and Evidence-Based Medicine on syntactic patterns and variations in RA titles[1]

STEFANIA CONSONNI

Abstract – Although titling is traditionally a lexically and textually prominent operation, performing key informative/persuasive/promotional functions in discourse domains such as advertising and entertainment, the spread of Web-based communication has increased its importance with respect to practices farther away on a discoursal spectrum from such functions as medical communication. The inception of the Internet as the main channel for knowledge dissemination has brought about significant changes in the titling of highly specialized discourse. Medical RA titles (RATs) seem, as a genre, to provide insights into the impact of digital literacy on scientific knowledge. In order to explore such changes, a total of 1250 RATs from the *British Medical Journal* – the world's first online medical journal – were collected from a 20-year period, and analysed with AntConc and Wordsmith Tools. The RATs in the corpus trace the history of the Human Immunodeficiency Virus from 1985, when the first WHO conference on AIDS was held in the USA, until 2005. The paper analyses and contrasts print *vs*. digital RATs, identifying and quantifying the key syntactical/textual patterns and variations in a genre whose main function is to package/textualize scientific contents (including competing clinical methodologies), as well as to disseminate them across specialized and/or lay audiences. Research questions concern the extent to which the language of RATs has been changing with respect to the dissemination triggered by digital literacy, from crystallised and gate-keeping formulations to more articulated ones, placing distinctive emphasis on argumentative/persuasive/metadiscoursive functions, as well as the impact of Evidence-Based Medicine – today's leading paradigm for scientific knowledge, first presented in *BMJ* in 1995 – on contemporary HIV discourse.

Keywords: Medical titles; digital literacy; discourse analysis; HIV; Evidence-Based Medicine.

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1. Introduction

This chapter analyses HIV discourse in the *British Medical Journal* in a time span of twenty years, from 1985 – when the first world conference on AIDS was held in the USA – to 1995, the year *BMJ* started to implement Evidence-Based Medicine (EBM) and to be published online, and from 1995 to 2005. RA titles (henceforth RATs) will be investigated as a key strategy for knowledge dissemination, by comparing their functions and impact before and after the inception of EBM and of digital literacy practices. The purpose of the study is to identify and quantify the key patterns and variations in a genre whose main function is to package/textualize scientific contents and to contribute to their widest possible dissemination, and thereby to explore the impact of new research procedures and new communication paradigms on the traditionally codified discourse of clinical knowledge. Insights will also be provided as to the linguistic history, in terms of both clinical representation and discursive dissemination, of a life-threatening and socially sensitive pathology.

The epistemological framework for this paper is provided in two classics on scientific expository practices:

1. In *Naissance de la clinique*, Michel Foucault (1963) argues that clinical knowledge was born at the end of the Eighteenth century as the truth effect of discourse practices producing a system of beliefs around the physiology and pathologies of the human body. Bodies, tissues and diseases entered the field of scientific truth, which is always framed within a specific discursive period: clinical authority relies on its relationship to the current organisation of knowledge, not so much to a non-discursive state of affairs (i.e., clinical reality as it is). Scientific truth is the result of ongoing negotiation between knowledge production and popularization, which explains why medical discourse has recently been evidenced as a contingent construction, varying among different periods and epistemologies, as well as across different pragmatic contexts.
2. As Shinn and Whitley (1985) argue, scientific discourse practices are ideologically non-neutral. Far from being "polished, objectified, linear and persuasive" (Bucchi 1998), scientific research depends on dissemination, a transactional phenomenon impacting on research in ways which cannot be detached from research itself, and involving a variety of actors and audiences. Clinical legitimization comes from audiences including not only fellow physicians and training experts, but also non-scientific audience segments (i.e., a number of professions drawing credibility from the use of scientific knowledge), as well as the growing business/corporate public (which may in turn seek legitimization from scientific discourse, while exerting influence on the purposes and directions of research), and the lay

public of popularization. Feedback from all the strata involved in this process produces and validates knowledge, and contributes to fixing research agendas throughout disciplines, especially in the case of socially impactful pathologies such as HIV.

As a matter of fact, the dissemination process inherent to medical expository practices has been immensely amplified over the last two decades by the Internet, that is, by the digital environment and Web-based communication strategies. In this respect, medical RATs have proved to be a crucial genre. Although titling has been – since classical rhetoric – a *per se* lexically, syntactically and textually prominent operation, one that typically performs key informative/persuasive/promotional functions in discourse domains such as the media, advertising and entertainment (Hartley 2005a, 2005b; Martin 1998; Straumann 1935), the spread of Web-based communication has increased its importance with respect to practices traditionally farther away on a discoursal spectrum from such functions, such as medical communication (Calsamiglia 2003; Calsamiglia, Van Dijk 2004; Jaime Sisó 2009; Giannoni 2014; Gotti *et al.* 2015; Myers 2003; Smith 2000; Soler 2007; Swales 2003).

By "medical RAs" this paper refers to specialized texts, generally aimed at a specialized audience of fellow researchers/clinicians, displaying the IMRD format (i.e., Introduction, Method-Materials, Results, Discussion, which all "evidence a good deal of experimental work"), and forming the genre which serves as a "generator of new knowledge about a specific subject" (Soler 2007, p. 92), and whose main expected pragmatic function is referential/informative. By "RATs" this paper refers to typically concise structures, preceding and associated to a longer text, which they both synthesize (in terms of informative content) and present in an efficient/appealing way (that is, providing accurate directions as regards the RA's text type and pragmatics). In medical communication, RATs can be said to perform a number of pragmatic functions:

1. Informativity: in its conciseness, transparency and completeness, the science title is "an up-front, straightforward presentation of information, whether the information is that of what the paper has established or what the paper is about" (Haggan 2004, p. 313). In terms of cognitive psychology, titles are advanced textual organizers, revealing preview information from a later, more extended text (Kozminsky 1977).
2. Retrievability of RAs in terms of online search engine optimization: "titles in publications are key elements in the organization and retrieval of scholarly data" (Soler 2007, p. 91), surrogating the document "in bibliographies, databases, indexes and reference lists" and the Web in general (Yitzhaki 1997, p. 220).

3. Attractiveness: the title attracts a reader's attention to a paper and presents its content from a short glimpse, "thus contributing to its initial selection or rejection" by other researchers (Hjørland, Nielsen 2001, p. 264).[2]

The present analysis considers RATs on HIV published in the *British Medical Journal* from 1985 to 2005. The choice of journal, as well as of time span and clinical specialty, is not unfounded, for two reasons:

1. In 1995, *BMJ* was the world's first general medical journal to go fully online.[3] The first research question of this paper therefore concerns the extent to which the language of RATs has been changing with respect to the global knowledge dissemination process brought about by electronic literacy, and more specifically, the extent to which such process has also been influencing the titling of highly specialized, expert-to-expert discourse, from markedly standardised, crystallised and gate-keeping formulations to more articulated textual, metadiscursive and pragmatic functions (Garzone 2006; Gotti 2003, 2013; Hyland 2005).
2. In 1995, *BMJ* started to systematically implement Evidence-Based Medicine, the most influential definition of which is provided by Sackett *et al.* (1996) in *BMJ* itself. EBM is today's leading paradigm for medical knowledge, first introduced in 1992 to set out completely new methodological procedures and protocols in the life sciences. EBM is "the use of mathematical estimates of the risk of benefit and harm, derived from high-quality research on population samples, to inform clinical decision-making in the diagnosis, investigation or management of individual patients" (Greenhalgh 2010, p. 1). It stands in opposition to traditional practice, which revolved around individual clinical expertise (the commonest approach until the early 1990s), in that it stems from "the best available external clinical evidence from systematic research" (Sackett *et al.* 1996, p. 71), i.e., from the systematic statistical analysis of data, which leads to the formulation of questions and testing of hypotheses.

EBM is based upon what is commonly referred to as the "pyramid of evidence", where several levels of evidence provided by clinical research are ranked according to their reliability. The levels are arranged in a system

[2] A summary of these three functions (Genette 1988, pp. 178-179) is provided in Zeiger (1991, cited in Wang, Bai 2005, p. 390): "the hallmarks of a good title are that it accurately, completely and specifically identifies the main topic or the main point of the paper, is unambiguous, is concise, and [provides] important term[s]" with reference to the clinical topic and/or the methodology/research protocols employed.

[3] Founded in 1840 as the *Provincial Medical and Surgical Journal*, the journal launched several medical discoveries of the Twentieth century, including the use of chloroform during Queen Victoria's eighth childbirth (1847), Joseph Lister's observations on antisepsis in surgery (1867-79), the link between Anopheles mosquito and malaria (1898), the first streptomycin trial (1948), and the first report on smoking and lung cancer (1950).

accounting for the strength of their results on the basis of the study design, i.e., the methodological description – involving participants, implements and procedures, as shown in Figure 1 – to be found in the Method section of RAs.

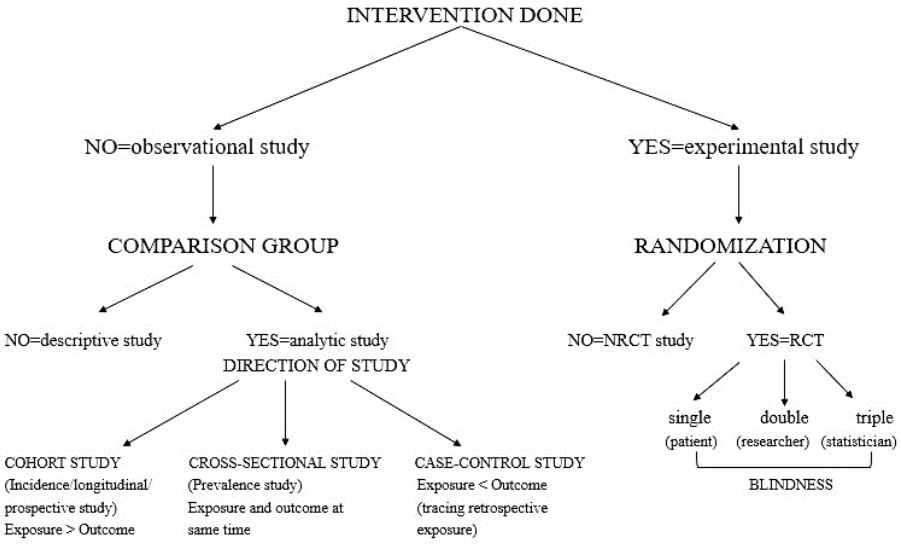

Figure 1
EBM study designs.

The Pyramid reveals how to weigh different levels of evidence in order to make health-related decisions (Greenhalgh 2010, pp. 18-45), putting the results of each study design into a hierarchy based on the relative strengths and weaknesses of each piece of research, as can be seen in Figure 2:

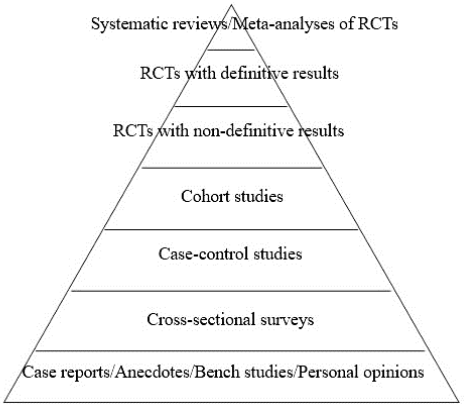

Figure 2
The pyramid of evidence.

Each level represents a different study design and corresponds to increasing quality/reliability of evidence and expected result accuracy, as well as decreasing chance of statistical error, and to minimized bias from confounding variables potentially influencing clinical results:

i. Systematic reviews of RCTs are gold-standard sources; started in the 1980s under the inspiration of Archibald Cochrane, they search broadly for clinical trials on a topic and pool the results statistically; they confront different findings among different studies on the same topic, which makes them likely to be robust and generalizable.
ii. Randomized Controlled Trials (RCTs) randomly allocate participants to either one intervention (e.g. drug treatment) or another (e.g. placebo treatment). Both groups are followed up for a specific period of time, and analysed in terms of specific outcomes defined at the outset of the study (e.g. death, heart attack, etc.). There can be several levels of blindness in an RCT, when patients, researchers and statisticians themselves are not informed as to how patients are allocated to interventions.
iii. In a cohort (longitudinal/incidence) study, a fixed sample of population is measured repeatedly on the same variables, providing a series of pictures illustrating change over time.
iv. In case control studies, patients undergo controls on past exposure to a possible causal agent for a particular condition (frequently used to determine the aetiology of disease, not treatment, e.g. rare conditions).
v. In cross-sectional (prevalence) surveys, a collection of information is taken only once from a given sample of population.
vi. Case reports are descriptions of a patient's medical history in the form of a story, and lie at the bottom of the pyramid with traditional forms of knowledge such as anecdotes, bench studies and personal opinions.

In the light of the above, the second research question in this paper takes into account the impact of EBM – as the gold-standard paradigm in scientific production and dissemination – on the language of medical RATs, and the changes in pragmatic scope and methodological positioning it brings about in contemporary medical literature on HIV.

It is also worth mentioning that the clinical specialty investigated in this paper is HIV, whose literary history in the international scientific community started exactly in 1985.[4] In March 1985 the FDA licensed the first ELISA commercial test to detect antibodies to the virus. In April the same year, the first WHO conference on AIDS was held in Atlanta, Georgia. In May 1985,

[4] The earliest case of infection with HIV-1 in a human was detected in 1959 in Congo. HIV-1 may apparently have originated in the 1940s or early 1950s. In the mid-1970s, the virus spread in the USA, where a number of cases of pneumonia, cancer and other pathologies were reported by doctors in LA and NY to be related to male homosexuality. In 1982 the term AIDS was first used to describe opportunistic infections and other pathologies linked to the virus. In 1983 the virus triggering AIDS was discovered; it was first named HTLV.III/LAV. The name was changed to HIV in 1986. In 1999 the origin of the HIV-1 virus in a subspecies of chimpanzees in west Africa was discovered; the first humans might have been infected by the animals' blood while hunting.

the International Committee on Taxonomy of Viruses ruled that the pathogen responsible for AIDS – first discovered in May 1983 by a French research team as a retrovirus called LAV – should be named the Human Immunodeficiency Virus.[5]

2. Materials and Method

For the purpose of this analysis,[6] a corpus of RATs has been assembled, covering the totality of RAs published in *BMJ* between 1985 and 2005. 1995 was taken as a dividing year between two subcorpora, i.e., 1985-1994 *vs.* 1995-2005. To create the corpus, the *BMJ* open-access electronic archive was used.[7] An advanced search by keyword was performed (KW: HIV, sorted by relevance), after which the resulting items were sorted manually on year-by-year basis, in order to extract RAs, i.e., "full-length original research articles, published in the main part of the journal" (Yitzhaki 1997, p. 222), excluding other texts, such as for instance literature review papers. A total of 1250 RATS were collected, 950 of which published in the time span 1985-1994 (subcorpus 1), while 300 in 1995-2005 (subcorpus 2). Table 1 shows the distribution of ATs in the corpus.

Year	**No. items**	**Year**	**No. items**
1985	0	1995	27
1986	34	1996	20
1987	198	1997	28
1988	56	1998	37
1989	135	1999	31
1990	124	2000	21
1991	115	2001	30
1992	157	2002	28
1993	102	2003	34
1994	29	2004	20
		2005	24
Tot. 1985-1994	**950**	**Tot. 1995-2005**	**300**
TOT. 1985-2005			**1250**

Table 1
Distribution of ATs in the corpus.

Assuming that RATs perform key pragmatic functions in terms of informativity/retrievability/attractiveness with respect to the ensuing RA

[5] The HIV and AIDS timelines used in this paper were retrieved from https://www.hiv.gov/hiv-basics/overview/history/hiv-and-aids-timeline.
[6] Materials have been analysed using AntConc (Anthony 2016) and WordSmith Tools (Scott 2017).
[7] Available at http://www.bmj.com/archive. This covers the journal's paper (1840-1994) and online (1995-) archives.

(White, Hernandez 1991; Eyrolle *et al.* 2008), this paper will analyse the strategies enacted by digital, evidence-based medical discourse on HIV.

The analysis will focus on the ways meaning is worded out in conceptual and syntactic terms, and, more specifically, on the way RATs are organised in structural and textual terms. At structural level (Fortanet *et al.* 1998; Haggan 2004; Yitzhaki 1997; Swales 2003; Soler 2007; Jaime Sisó 2009; White, Hernandez 1991; Hjørland, Nielsen 2001), titling constructions will be distinguished into conclusive, interrogative, compound and nominal. By contrasting title construction strategies before and after 1995, the paper will analyse how and to what extent the structural patterning of RATs has been changing in connection with the abovementioned key factors. At textual level, the introduction of expanded nominal phrases in compound titles will be read as a metadiscursive strategy (Hyland 2005; Hartley 2005b, 2007), performing evidential textualization of EBM study design concerns, and thus reflecting changing attitudes towards the production and dissemination of medical knowledge across the 1980s and the 1990s.

3. Results

3.1 No. of RATs/year and AVG sentence length

Table 2 presents an overview of the number of RATs published per year and per subcorpus, as well as the average sentence length per year and per subcorpus.

Year	**No. items**		**AVG s. length**	**Longest**	**Shortest**	**Year**	**No. items**		**AVG s. length**	**Longest**	**Shortest**
1985	0	AVG items/year: 95	--	--	--	1995	27	AVG items/year: 27.7	11.5	24	6
1986	34		8.9	24	3	1996	20		12.9	24	6
1987	198		6.9	24	1	1997	28		14.1	21	10
1988	56		8.4	19	1	1998	37		15.2	28	5
1989	135		8.9	28	2	1999	31		14.6	24	9
1990	124		8.5	21	2	2000	21		14.3	24	6
1991	115		7.8	24	1	2001	30		14.8	39	5
1992	157		8.2	36	1	2002	28		14.5	28	5
1993	102		8.5	24	2	2003	34		14.4	22	7
1994	29		12.19	26	1	2004	20		14.4	28	6
						2005	24		14.7	27	9
Tot. 1985-1994	**950**		**8.7**	**--**	**--**	**Tot. 1995-2005**	**300**		**14.3**	**--**	**--**
Tot. 1995-2005	**1250**								**1.5**	**--**	**--**

Table 2
No. of items/year and AVG sentence length/year.

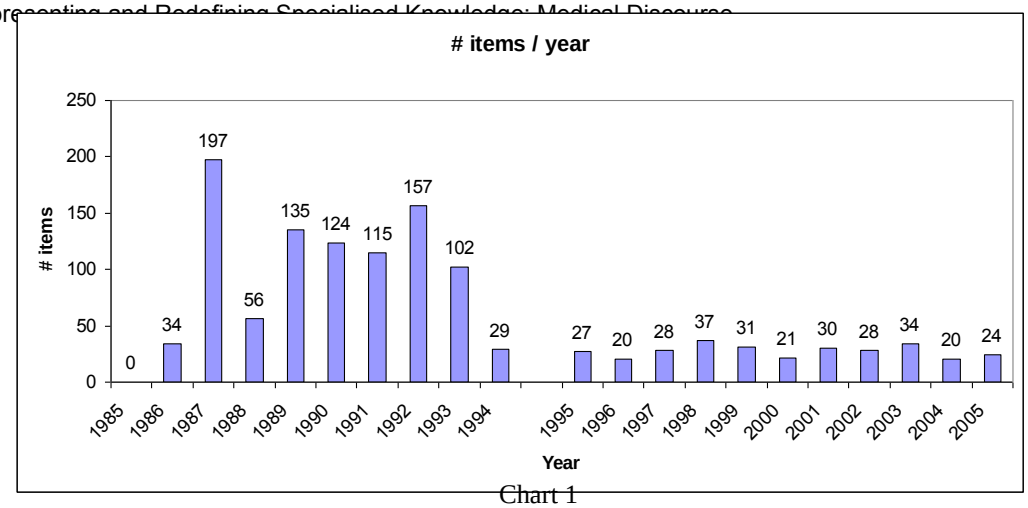

Chart 1
No. items/year.

In 1987, the year the first successful antiretroviral drug (zidovudine AZT) became available, 197 RAs were published; in the 1990s, when AIDS (i.e., the third and final stage of HIV infection) became the object of international epidemiological surveillance, the number of published RAs dropped by almost 70%. Experimental studies on HIV started back in June 1981, when five deaths from an immunodeficiency syndrome, first called "gay cancer" and then GRID, Gay-Related ImmunoDeficiency, were reported in the *Morbidity and Mortality Weekly Report* by the US Centers for Disease Control and Prevention. In 1982, the name AIDS began to circulate in Western medical and media discourse as an aggressive epidemic,[8] progressively involving different population groups, (apparently) starting with male homosexuals, and later involving other categories, such as male and female prostitutes and injecting drug users, and finally involving heterosexual and vertical (mother-child) transmission. The gradual spread of the infection and related pathology is evidenced by titles such as the following (from the first subcorpus):

(1) Willingness of homosexual and bisexual men in London to be screened for human immunodeficiency virus. [1986]
(2) Risk of AIDS related complex and AIDS in homosexual men with persistent HIV antigenaemia. [1987]
(3) Prostitute women and public health. [1988]
(4) Risk behaviours for HIV infection among injecting drug users attending a drug dependency clinic. [1989]
(5) Heterosexually acquired HIV infection. [1989]
(6) Mothers with HIV. [1989]

As shown in Chart 1, the number of published items sharply decreases in 1994, with figures dropping from 102 to 29 the very year AIDS became the

[8] Deaths covered by media speculation include actor Rock Hudson (1985), photographer Robert Mapplethorpe (1989), artist Keith Haring (1990), popstar Freddie Mercury (1991) and dancer Rudolf Nureyev (1993).

leading cause of death in Americans aged 25-44. This may appear as a puzzling circumstance, for which there is no conclusive, univocal explanation. The decrease might be read as a consequence of more advanced knowledge of the virus' behaviour and related pathologies, and/or growing coverage of sensitive areas in social and medical behaviour through the diffusion of guidelines (issued by the US Centers for Disease Control and Prevention) for preventing the diffusion of HIV, and of massive institutional investments in research. As a matter of fact, in 1993 President Clinton established the National Office for AIDS policy at the White House. Also, in June 1994 the FDA approved the first HIV protease inhibitor, which introduced a new era of highly active antiretroviral therapy (HAART). In 1995 saquinavir, a key active ingredient, was approved for prescription use (stage I trials having started in 1989), followed within four months by ritonavir and indinavir, which significantly reduced AIDS death rates within two years – at least in the Western world. We can hypothesize that the introduction of such treatment perspectives might in some way have limited the initial fear of a global AIDS pandemic, although this is mere speculation. What is known for sure is that after 1994, that is, in the second subcorpus, data stabilizes at an average of 27.7 RAs per year.

Trends appear reversed as concerns the average word number per subcorpus, which increases from 8.7 words in 1985-94 to 14.3 words in 1995-2005. Information as to the longest *vs*. shortest constructions is also provided in Table 2, where the shortest constructions between 1985 and 1994 amount to a single word, such as in the following examples:

(7) Casualties. [1987]
(8) Contraception. [1991]

The shortest items in the second subcorpus amount to at least 5 words, while the longest can reach up to 39 words:

(9) Neuropsychiatric complications of nevirapine treatment. [2002]
(10) Prevalence of antibodies to hepatitis B, hepatitis C, and HIV and risk factors in entrants to Irish prisons: a national cross sectional survey: Commentary: efficient research gives direction on prisoners' and the wider public health except in England and Wales. [2001]

As no parameters for title length are to be found in the International Committee of Medical Journal Editors (ICMJE)'s *Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals*,[9] or in *BMJ*'s own guidelines for manuscript submission,[10] the

[9] "The title provides a distilled description of the complete article and should include information that, along with the Abstract, will make electronic retrieval of the article sensitive and specific. Reporting guidelines recommend and some journals require that information about the study design be a part of the title

Discussion section of this paper will connect and interpret this data in connection with the two key paradigm shifts taking place at *BMJ* from 1995 on, i.e., the inception of digital communication and of EBM.

3.2 Structural construction of RATs

RATs can be distinguished into four categories, according to different syntactical organizations of the informative material, which can be positioned along a pragmatic continuum between two functions, i.e., efficient information packaging and scientific attractiveness (Sala, Consonni 2018). Table 3 (on the next page) shows the distribution of RATs per year and per subcorpus.

3.2.1 Conclusive titles

Conclusive (full-sentence/declarative) titles are syntactically and semantically autonomous structures, containing finite verbal forms specifying the semantic relationship among the lexical elements in the sentence, as in the following examples:

(11) When things go wrong. [1986]
(12) It is not one of "them"; it is one of all of us. [1988]

In the 1985-94 subcorpus, 17 conclusive titles are present, totalling 1.78%; in 1995-2005, only 2 full-sentence titles can be found (0.67%). This indicates that conclusive titles never appear to have been a popular option for structuring RATs on HIV. Most occurrences in the corpus are, moreover, to be found in the years 1986-88, that is, in the very initial stages of clinical research on the virus. This may be due to the fact that scientific full-sentence titles tend to be related to pragmatic necessities such as informative density/attractiveness, mirroring the researcher's need to quickly inform readers about the contents of the RA, while readers are in turn needing to "know as early as possible in the reading process whether or not the paper contains anything that is of relevance" (Haggan 2004, p. 296). On the other hand, though, conclusive titles may reveal confident assertions, "presented as statement of facts", usually in the present simple tense, reproducing what is known as the "block language" of newspaper headlines (Quirk, Greenbaum 1973); as Table 3 shows, 70.6% of occurrences in the first subcorpus are in the present tense.

(particularly important for randomized trials and systematic reviews and meta-analyses)". Retrieved from http://www.icmje.org/recommendations/browse/manuscript-preparation/preparing-for-submission.html#a.

[10] Available at http://www.bmj.com/about-bmj/resources-authors/forms-policies-and-checklists/title-page.

Year	Conclusive	Interrogative	Nominal	Compound
1985	0	0	0	0
1986	4 *pres. tense: 3*	0	27	3
1987	6 *pres. tense: 4*	4	132	55
1988	3 *pres. tense: 1*	1	36	16
1989	1 *pres. tense: 1*	2	106	26
1990	1 *pres. tense: 1*	2	92	29
1991	2 *pres. tense: 2*	7	71	35
1992	0	4	115	38
1993	0	8	67	27 *EBM in exp. NP: 4*
1994	0	1	23	5
Tot. 1985-1994	**17 (1.78%)** ***pres. tense: 12 (70.6%)***	**29 (3.05%)**	**669 (70.42%)**	**234 (24.64%)** ***EBM in exp. NP: 4 (1.7%)***
1995	0	1	15	12 *EBM in exp. NP: 3*
1996	0	1	10	9 *EBM in exp. NP: 4*
1997	0	0	7	21 *EBM in exp. NP: 8*
1998	0	0	10	27 *EBM in exp. NP: 19*
1999	0	0	8	23 *EBM in exp. NP: 14*
2000	0	0	5	16 *EBM in exp. NP: 14*
2001	0	0	4	25 *EBM in exp. NP: 18*
2002	0	1	7	20 *EBM in exp. NP: 19*
2003	0	0	5	29 *EBM in exp. NP: 27*
2004	2 *pres. tense: 2*	0	1	17 *EBM in exp. NP: 15*
2005	0	1	6	17 *EBM in exp. NP: 17*
Total 1995-2005	**2 (0.67%)** ***pres. tense: 2 (100%)***	**4 (1.33%)**	**78 (26%)**	**216 (72%)** ***EBM in exp. NP: 158 (73.15%)***

Table 3
Distribution of structural constructions/year/subcorpus.

This may indicate "confident optimism projected by the writer that what he is reporting stands true for all time or is not simply a one-off occurrence", as though the researchers were conveying "the certainty that the method, measurements, calculation etc. employed have yielded impregnable findings" (Haggan 2004, p. 297). Occurrence of conclusive titles in the 1995-2005 subcorpus is in fact accompanied by the use of hedges, especially in the form of the modal verb *may*, which limits the scientist's claim for credibility, as in the following example:

(13) Acquired haemophilia A *may* be associated with clopidogrel. [2004; emphasis added]

3.2.2. Interrogative titles

Interrogative titles are formulations constructed as questions, conveying meanings interrogatively rather than assertively, thus either pointing out possible cognitive gaps to be dealt with in the ensuing RA, which the reader might wonder about, or casting doubts over previous research conclusions. In this respect, interrogative titles typically express "queries in need of reply, interpretation, and conclusion" (Soler 2007, p. 100), as in the following examples:

(14) After safe sex, safe surgery? [1987]
(15) How informed is patients' consent to release of medical information to insurance companies? [1989]
(16) Is risk of Kaposi's sarcoma in AIDS patients in Britain increased if sexual partners came from United States or Africa? [1991]

Since interrogative RATs may be considered as syntactical expressions of doubt, paralleling in some way medical research as a question process, it seems coherent that they represent only 3.05% of the 1985-94 subcorpus (29 occurrences), dropping to 1.33% in the second subcorpus (4 occurrences) and remaining nearly silent after 1997.

3.2.3 Nominal titles

Nominal titles are structures either consisting of single verbless expressions, or containing non-finite verbal forms (such as gerund, participle, *to* + infinite, etc.). These are typical of "block language" (Straumann 1935), '*headlinese*' (Garst, Berstein 1963), or economy grammar (Halliday 1967), and often found in contexts with fixed space constraints – such as advertising, book titles, and newspaper headlines. They are generally associated with the omission of auxiliaries (*be*, *have*, *do*) and articles (*a/an*, *the*), and a preference for passive voice and nominalization, as can be observed in the following examples, taken from both subcorpora:

(17) AIDS, them, and us. [1987]
(18) Female streetworking prostitution and HIV infection in Glasgow. [1992]
(19) Prevalence of HIV and injecting drug use in men entering Liverpool prison. [1998]
(20) Cost effectiveness analysis of strategies for maternal and neonatal health in developing countries. [2005]

In the 1985-94 subcorpus, nominal constructions are dominant, represented by 669 items (70.42%) and followed by compound titles (24.64%), whereas proportions become inverted in the 1995-2005 subcorpus, where nominal titles drop to 26% (78 out of 300 occurrences) and compound titles increase to 72% (216 items). As new discoveries and advancements were being made in HIV research, as it were, nominal syntax probably no longer seemed to be the most appropriate strategy, for it is clear from Table 3 that nominal titles become recessive in the 1995-2005 subcorpus, to the benefit of compound constructions.

3.2.4 Compound titles

Compound (colonic/hanging, Hartley 2005b) titles are composed of two semantically related parts (phrases, clauses or full sentences, both declarative and interrogative) typically joined by a colon, full stop, dash or other punctuation mark (Hartley 2007, p. 553). In terms of thematic structure, they are organized as theme-rheme clusters, where the former part of the title introduces the RA's topic and the latter one – usually an expanded noun phrase, in which particular aspects of the topic to be dealt with are specified – highlights its relevance by framing it in 'general-specific', 'cause-effect', 'problem-solution', 'research question-research method' patterns. Instances of compound titles from both subcorpora are provided below:

(21) Campaign against AIDS in Switzerland: evaluation of a nationwide educational programme. [1986]
(22) Infertility management in HIV positive couples: a dilemma. [1991]
(23) Risk of HIV related Kaposi's sarcoma and non-Hodgkin's lymphoma with potent antiretroviral therapy: prospective cohort study. [1999]
(24) Treatment exhaustion of highly active antiretroviral therapy (HAART) among individuals infected with HIV in the United Kingdom: multicentre cohort study. [2005]

As already mentioned, while the majority of RATs in the former subcorpus are nominal in structure, the trend is reversed from 1995 on: Table 3 shows that in 1995-96 the proportion is more evenly balanced, with nominal titles still slightly outnumbering compound titles (15 and 10 *vs*. 12 and 9 respectively), but as of 1997 figures steadily confirm the predominance of compound over nominal structures. In 2004 only one nominal title was published *vs*. 17 compound titles. As will be argued in the Discussion section of this paper, the increasing preference for compound syntax in the later

subcorpus may again be related to the communicative and epistemological shift brought about in the mid-1990s by electronic literacy and the EBM paradigm.

3.3 Information patterning in compound titles

Table 3 also shows a significant change in the strategies that compound titles tend to use in order to package/sequence information for readers. Such

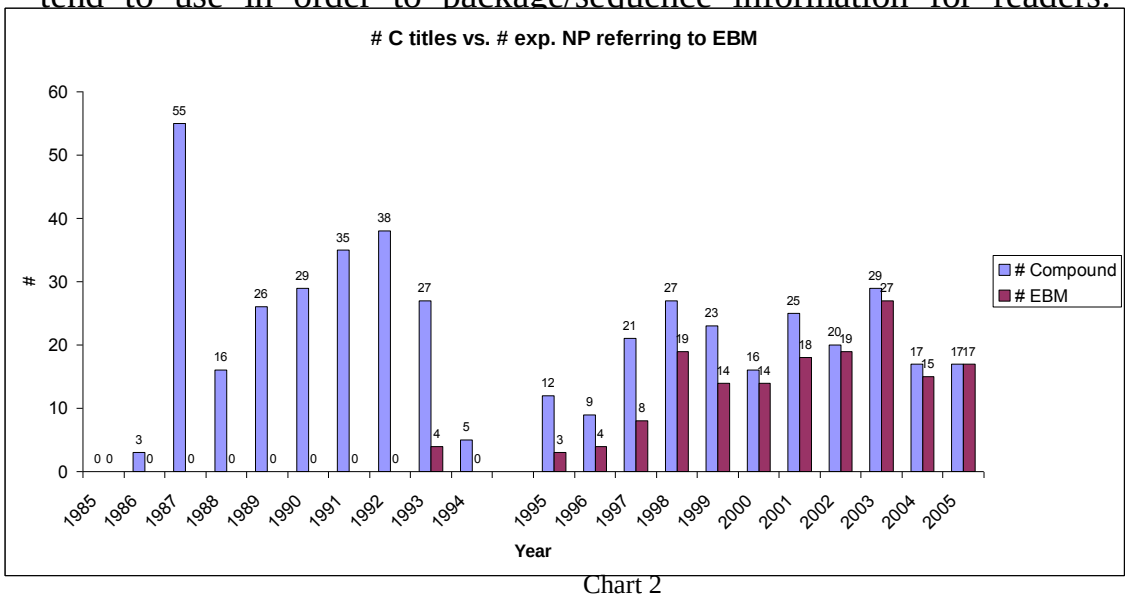

Chart 2
No. of compound titles *vs.* No. of expanded noun phrases focusing on EBM study design.

Provided that the thematic part of compound titles generally focusses on the clinical topic to be dealt with in the RA, in the former subcorpus the expanded noun phrase following the colon (and occupying the rheme/filler position) covers a range of topics, eliciting the reader's curiosity, which mainly concern HIV or its development into AIDS. These may range from details about the infection's onset, progress and geography, to social groups involved in the epidemic, to specific variables linked to clinical aspects of the disease; but nothing in compound titles in the years 1985-94 seems to specifically refer to the methodology of research employed in the ensuing RA. The most frequent topics seem generally related to epidemic details or pathways to possible treatment, as in the examples below:

(25) AIDS: a faltering step. [1987]
(26) Surveillance of AIDS cases: how acceptable are the figures? [1988]
(27) Early HIV infection: to treat or not to treat? [1990]
(28) No escape: HIV transmission in jail. [1993]

Conversely, the 1995-2005 subcorpus shows an increasing number of rhematic noun phrases explicitly referring to EBM practice and study design features, i.e., the methodology following which the research was conducted,

which proves a crucial factor in a RA's critical appraisal, that is, its hierarchical evaluation in terms of clinical evidence and scientific prestige. In such noun phrases, specific reference is made to EBM study design within the hierarchy of evidence, which the reader is invited to check out and assess by reading the Method section. In the years 1995-97, approximately 30% of rhematic noun phrases focus on study design terminology, as in the following examples:

(29) Does the onset of tubercolosis in AIDS predict shorter survival? Results of a cohort study in 17 European countries over 13 years. [1995]
(30) Mortality associated with HIV-1 infection over five years in a rural Ugandan population: cohort study. [1997]

The percentage rapidly grows to around 60% of occurrences in 1998-99, while from 2000 on nearly 100% of compound titles refer to EBM study design, which tends to occupy the whole filler slot at the expense of previously foregrounded details (e.g. geographical or social variables involved in the research). That is to say, in the later subcorpus the rhematic/new information part of compound titles no longer focuses on HIV infection *per se*, but on global HIV control through massive evidence-based research and therapy, as in the following examples:

(31) Effect of zinc supplementation on malaria and other causes of morbidity in West African children: randomised double blind placebo controlled trial. [2001]
(32) Effect of iron supplementation on incidence of infectious illness in children: systematic review. [2002]
(33) Stable partnership and progression to AIDS or death in HIV infected patients receiving highly active antiretroviral therapy: Swiss HIV cohort study. [2004]
(34) Treatment exhaustion of highly active antiretroviral therapy (HAART) among individuals infected with HIV in the United Kingdom: multicentre cohort study. [2005]

In these structures, the sequential "add-on" theme/rheme patterning indicates the positioning of each piece of research – such as, for instance, a cohort study, RCT, systematic review, etc. – within the EBM paradigm, and tends to coincide with the structure's textualization in terms of Information Unit. The thematic part of the title (the given part of the message) usually refers to a specific clinical aspect of HIV. Interestingly, very few titles still focus on the aetiology of the virus after 1995, as this had probably been clarified by previous research, while most deal with prolonging life expectancy through combined antiretroviral treatment, and/or with the neutralization of AIDS's most aggressive consequences, especially in developing countries. The rhematic part (the new part of the message) more and more tends, on the other hand, to conspicuously coincide with the research's study design.

4. Discussion

The phenomena identified and quantified so far can be discussed in relation to the two key factors considered in the research questions of this paper, that is, the impact of the Internet and digital literacy, and of EBM clinical protocols, on the codification and transmission of written medical discourse about HIV.

As concerns the average title length (cf. Section 3.1, Table 2 and Chart 1 above), both factors can be evidenced as influencing the patterns and variations of RATs between the subcorpora. With respect to *BMJ*'s migration from paper to server, the brevity of titles prior to 1995 may be due to the constraints of limited space in the printed edition of the journal, with "the resulting need to be brief and succinct" (Haggan 2004, p. 294). On the contrary, increasing length in the second subcorpus may indicate a steady growth in RAT's informative content, compatible with increased space availability in online publication (which would agree with results presented in Berkenkotter, Huckin 1995, and mirror a common "time factor" trend in scientific titles, as evidenced in Yitzhaki 1997, p. 221). Finally, and importantly, the length of a title is crucial to its online retrieval; the longer the title, the more lexical items it contains, and the greater the chances that it may be retrieved by a query.

Alongside the changes brought about by digital publication, the data may also be explained following the evolution in HIV research and knowledge during the 1990s. As a field of research becomes more complex, RATs are actually expected to become longer and to mirror "the development, refinement, and extension both of underlying theories and of more and more complex research methods and procedures" (White, Hernandez 1991, p. 731). As evidenced in Hjørland, Nielsen (2001, p. 266), although the hard sciences traditionally tend to have longer, more informative titles than softer and popular sciences, the increase in average sentence length observed in the present corpus may be due to "increasing specialization in research, creating a need for more words to express a given piece of research" (*ibid.*). This seems compatible with the onset of EBM at *BMJ* from 1995 on, as longer and more complex titles function as vehicles to disseminate a whole new medical epistemology.

Concerning the patterns and variations evidenced among the four syntactical categories of RATs in the corpus, the impact of digital literacy and EBM can be observed at different levels. The different frequency patterns of conclusive titles between the subcorpora (see Section 3.2.1 above) may firstly suggest a conflation in RATs between scientific and promotional language, especially where '*headlinese*' effects are employed to express some degree of epistemological certainty on the topic. In the case of HIV research,

conclusive titles may be hypothesized to mirror the assertive/urgent tone of initial research, that is, in the former subcorpus, when scientific interest was mainly concerned with the transmission of the virus (initially involving certain stigmatized social categories), and before the actual complexity of multiple aetiological and clinical factors was taken into serious consideration. This can be confirmed by the fact that the use of conclusive sentences seems to disappear in the corpus as of 1991. The same trend is furthermore shown by the frequency of interrogative titles (cf. Section 3.2.2 above), which seems to confirm the results in Soler (2007, p. 100), and to reflect lesser need for the structural expression of scientific dilemma as time went by, from the mid-1980s to the late 1990s, when more decisive research on the virus was being carried out and the paradigm shift from traditional practice to EBM was well on its way.

The opposite incidence of nominal structures in the subcorpora (cf. Section 3.2.3 above) may in turn be interpreted as linked to both factors taken into consideration in this paper. The frequency of nominal constructions in the first subcorpus, with their high capacity for showcasing a discipline's substantial keywords, may be traced to the scientific need for lexicalization strategies in the early years of research, when HIV became an increasingly delicate social topic, as more research was being carried out, showing more complex aetiological factors and more detailed hypotheses concerning the progress of AIDS. The high prevalence of nominal structures may in this respect be associated to the prototypical classificatory nature of medical science, which tends to treat its object of study in taxonomical fashion (Soler 2007, p. 101). This seems to be a result shared by Haggan (2004, p. 307), who concludes that a noun phrase, accompanied by one or more post-modifying prepositional phrases and/or moderate to heavy pre-modification, is the most popular choice for traditional scientific title-patterning, guaranteeing that RATs attain both informative precision/explicitness (provided by the piling up of post-modifiers) and block-language-effect attractiveness (provided by shorter and generally more evenly balanced pre-modified structures; see also Rush 1998).

On the other hand, though, the increasing incidence of compound syntax from 1995 on (as shown in Section 3.2.4 and Chart 2 above) seems to mirror the impact of the new literacy standard brought about by digital communication in the mid- and late 1990s, whereby the use of the Internet as the main channel for knowledge articulation and dissemination has triggered significant changes in highly specialized discourse, from markedly standardised, crystallised formulations – meant for information filtering before lay dissemination – to more articulated ones, placing emphasis on distinctively argumentative, persuasive and metadiscoursive functions. Traditional informativity is thus complemented by attractiveness, which may

suggest further research into EBM communication as an interdiscursive area between scientific and advertising language (Haggan 2004; Hartley 2007; Bhatia 2004), thus paralleling and enriching the potential hybridity traditionally inherent to the use of conclusive – or '*headlinese*' – medical RATs (cf. Section 3.2.1 above).

Moreover, compound titles contain an increased number of lexical items, which on the one hand may be useful to retrieve RAs in online searches and specialized databases, while, on the other, providing room for showcasing essential research advancements, thus contributing to the diffusion of new knowledge and to its electronic retrieval. Whereas paper RATs are usually printed on the same page as, or in the vicinity of, the full RA, so that the correspondence between the research piece and its title is immediately clear, online textuality separates the title from the article, which is usually on a different webpage, for which reason the title needs to become at once a more informative (i.e., longer) and more autonomous structure. No longer ancillary to the ensuing RA, a compound title is in itself a semantically full textual typology, activating specific processing dynamics which can facilitate the decoding of the RA, including "attentional focusing during reading", "encoding of the text structure", governing "text summary and recall", determining "the relative importance of information supplied in a text", integrating "text information by establishing relations between different elements", and contributing "to the building of [readers'] cognitive representation" (Eyrolle *et al.* 2008, p. 242).

As noted in Hartley (2007, p. 558), compound titles allow writers to both attract and inform readers: this is achieved by means of the theme/rheme (or gap/filler) information sequencing they provide, whereby the reader's curiosity is engaged by the thematic part of the cluster (presenting a research question) and the filler slot is occupied by the rhematic part (offering insight into how the question will be addressed in the RA). The first part indicates the research area covered by the RA, while the second narrows down on the research's specifics, especially as concerns clinical applications of the topic, or other details concerning its positioning within the discipline (Haggan 2004, p. 302). In opposition to the traditional nominal structure – where findings are presented synoptically (usually through heavy pre-modification or the piling up of prepositional post-modifiers, which provide a mapping of the topic and findings) – compound titles follow a sequential "add-on" theme/rheme patterning, pivoting on the opposite principle, i.e., the principle of "presumption of ignorance" (*ibid.*). The writer must first present a hypothesis regarding his readers' knowledge of the topic/field of research, after which he has to draw their attention towards what he presumes they are ignorant/in need of, following the shortest path to easing the reader's processing of the text.

This represents an efficient system for both information packaging and attention drawing, which marks a dramatic change in the pragmatic purposes of expert-to-expert communication, from the elitist, gate-keeping, peer-to-peer traditional exchange of clinical practice (potentially viewed as bias after the inception of EBM) to the sharing of the best available evidence, where personal experience and bench studies rank low in the hierarchy of evidence. By performing both informative and attractive functions, as well as by revealing knowledge dissemination as a negotiation between hypotheses and expectations, compound titles can be read as a marker of a scientist/writer's own self-aware, negotiated positioning with respect to both Web literacy and the EBM hierarchy of evidence.

This trend seems to be confirmed by an increasingly frequent textualization strategy shown by RATs in the late 1990s, i.e., the packaging of methodological information in the rhematic part of the cluster (cf. Section 3.3 above). Such textualization strategy may be said to appear in the 1995-2005 subcorpus as a consequence of EBM implementation, and can be read on a metadiscursive level as a marker of evidentiality, i.e., a textual strategy signalling "the source of speaker's knowledge" (Johnstone 2009, p. 30) through "the ascription of information or opinion in a text to sources which may be animate or inanimate", such as a piece of empirical research, a clinical trial or a laboratory experiment (Hunston 2003, p. 181). By framing RATs within the EBM hierarchy of evidence, the expanded rhematic noun phrase in compound titles from 1995 to 2005 functions as a marker of discourse legitimization in the context of the new epistemic paradigm brought about by the inception of EBM.[11] Conversely, the general directional/geographic/social details provided in compound titles before 1995 (with the exception of the four nominal phrases conveying EBM practices in 1993) may, after the mid-1990s, appear as tokens of pre-EBM "bias", therefore progressively becoming recessive textualization resources.

5. Concluding remarks

This paper has aimed to identify and quantify the key syntactical and textual features of RATs dealing with HIV, with reference to the epistemological paradigm brought about in the mid-1990s by the onset of Evidence-Based Medicine, and to the digital literacy standard established by the use of the Internet as the main channel for contemporary knowledge dissemination. The

[11] This seems confirmed by the introduction of a rule in the preparation of new manuscripts for *BMJ*, according to which all research papers should include a description of its study design. Retrieved from http://www.bmj.com/about-bmj/resources-authors/forms-policies-and-checklists/title-page.

traditionally codified discourse of clinical pathology in highly specialized contexts such as the *BMJ* seems to have undergone major changes from the mid-1990s on, as significant trends have been highlighted by contrastive analysis between the two subcorpora: decreasing number of RAs published on HIV (950 *vs*. 300); increasing sentence length (8.7 *vs*. 14.3); opposite incidence of nominal and compound syntactical structures (respectively 70.42% *vs*. 24.64% in 1985-1994 and 26% *vs*. 72% in 1995-2005); increasing occurrence of EBM-related rhematic noun phrases in compound titles in the later subcorpus, from 1995-97 (30%) to 1998-99 (60%) to 2000 and beyond (100% in 2005).

The present data seems to suggest that major changes have been occurring in the process of knowledge dissemination within specialized discourse in the last thirty years, due to both factors taken in consideration in this paper. On the one hand, medical communication has found a strategic genre in RATs, which have become an increasingly impactful resource/convention for the sharing of clinical information meant for expert users. In particular, beside performing a key pragmatic function with respect to informativity and attractiveness, especially in the digital environment, the diffusion of compound titles provides an instant description of both the clinical topic addressed in the RA (to be identified with the thematic/given part of the structure's thematic sequence) and the study design employed to investigate it (to be found in the rhematic/new part of the structure). At the same time, compound titles allow readers and fellow researchers to rank the evidence provided in the RA within the EBM hierarchy. This means that, even before reading the actual abstract to the paper, readers can form an idea of what it will be about and what impact its results can be expected to have in terms of methodological credibility. Beside the traditional pragmatic functions of informativity and attractiveness, RATs thus seem to have increasingly developed a third and crucial function: an epistemological one.

Being a pilot study, this paper has compiled and analysed a corpus of titles from one source only (albeit an authoritative one). It is clear, however, that further research in medical linguistics related to the clinical and cultural history of HIV would benefit from the use of larger and more heterogeneous corpora. These may include journals from different cultural milieus such as, for instance, Europe *vs*. the USA, as well as from different scientific perspectives and epistemological coordinates, sampling publications with, for instance, different institutional affiliations and Impact Factors, etc. The use of larger and more comprehensive and articulated corpora would allow to look further into the linguistic and representative dissemination of HIV from a wider – and more interdisciplinary – angle.

The present data seems, however, to indicate that the onset of new scientific and literacy paradigms in the mid-1990s has progressively required

medical expository practices to finetune their communicative skills, and in particular to showcase as much information as possible as regards the methodological design of each piece of research that is published in expert-to-expert contexts such as the *BMJ*. By simply browsing digital search results, and by simply reading a compound title, qualified readers and fellow researchers will immediately know where to rank a piece of research into the hierarchy of evidential knowledge. RATs therefore seem to pragmatically activate scientifically effective expectation protocols in a specialized audience.

Bionote: Stefania Consonni is a researcher in English Language at the University of Bergamo. Her publications focus on textual paradigms, narratology, the semiotics of visual *vs*. verbal language, specialized communication in a discourse-analytical perspective, and the pragmatic features of traditional and digital genres within academic and professional discourse. She is an active member of the Research Centre on Languages for Specific Purposes (CERLIS), based at the University of Bergamo, and has been involved in inter-academic Research Projects, funded by the Italian Ministry of Education, on social and cultural studies and on specialized discourse.

Author's address: stefania.consonni@unibg.it

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